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Platelet Count in Preeclampsia and Eclampsia and its Association with the Severity of Disease

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ABSTRACT

Introduction: *Eclampsia is one of the commonest pregnancy complications in developing countries like Bangladesh and a major cause of maternal mortality and morbidity. This study was done to investigate the platelet count in preeclampsia and eclampsia cases and to evaluate its association with severity of disease conditions.* ***Methods:*** *Total 195 pregnant women with preeclampsia (67) and eclampsia (128), admitted in eclampsia ward of Dhaka Medical College Hospital (DMCH),were enrolled in this study from July 2009 to June 2011. An amount of 1.5 ml blood was drawn from the cubital vein of each patient and platelet count was done by Sysmex 800i fully automated haematology analyzer of Department of Haematology, DMCH.* ***Results:*** *Most of the patients were 25 years old or younger. The mean gestational age was 31.58± 2.42 weeks. Mean systolic and diastolic blood pressure of study subjects were 164.00± 22.64mm of Hg and 109.00±14.83mm Hg respectively. No significant correlation was found between systolic blood pressure and decreasing platelet count (p=0.271). Diastolic blood pressure (p=0.018) and proteinuria (p=0.044) showed statistically significant correlation with probability of developing thrombocytopenia. The severity of thrombocytopenia in pre-eclampsia and eclampsia showed very highly significant difference (p=.0001).* ***Conclusion:*** *Platelet count may be used as the easiest, earliest and cheapest indicator of severity of the disease. Early diagnosis and appropriate treatment results in better maternal and foetal outcome ensuring a good health care system.*

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INTRODUCTION

Eclampsia is one of the commonest pregnancy complications in developing country like us and a major cause of maternal mortality and morbidity. In Bangladesh 71% of total deliveries happen in home by unskilled birth attendants and only 23% of women deliver under medical supervision, the rest have no access to obstetric care[1].As a result most cases of preeclampsia remain unrecognized until severe complications like eclampsia occurs. It is estimated that every year eclampsia is associated with about 50,000 maternal deaths worldwide, predictably again most of which occur in the developing countries.[2] The current incidence of eclampsia are 0.04% to 0.1% in the United states and United kingdom, on the contrary with a much high rate as great as 15% in some parts of Asia, Africa and Latin America.[3]Eclampsia is the second most important cause of maternal death in Bangladesh contributing 20% of all maternal deaths due to obstetric complications.[2] Changes in the coagulation system in established preeclampsia is well documented. Out of all the haematological changes that occur in eclampsia or preeclampsia, thrombocytopenia is the most common. The degree of thrombocytopenia increases with severity of disease. Lower the platelet count, greater are maternal and foetal morbidity and mortality.[4] The lower platelet count in preeclampsia and eclampsia is associated with abnormal activation of the coagulation system and are believed to reflect increased platelet consumption.

METHODS

This cross-sectional study was done in Department of Obstetrics and Gynaecology and Department of Haematology of Dhaka Medical College Hospital, Dhaka. This study was carried out from July 2009 to June 2011. For the purpose of the study, Preeclampsia was defined as a condition with blood pressure of >140/90 mm Hg on at least two occasions, 4-6 hours apart after 20 weeks of gestation, along with proteinuria. Proteinuria was defined as excretion of 300 mg of protein or more every 24 hours in urine. A patient with pre-eclampsia when complicated with convulsion and/or coma was called a case of eclampsia. Total 67 preeclamptic patients and 128 eclamptic patients were included in the study. As there is an eclampsia ward present in Dhaka Medical College Hospital, larger numbers of eclamptic patients were available during the study period. Current study involved collections of both interview and laboratory data. Blood pressure was measured in lying position keeping the sphygmomanometer at the level of heart. Blood was collected by vein puncture from cubital vein into collection tubes containing an anti-coagulant EDTA. Platelet count was done by Sysmex 800i*- fully automated haematology analyzer of Department of Haematology, Dhaka Medical College Hospital, Dhaka. It primarily utilizes fluorescent based flow cytometry as the modality for analysis. From each blood sample, a slide was prepared and stained. Then it was manually counted under microscope and the count was matched. Urine protein (albumin) test was done by reagent strips (uric 2 V GP, Bayer GMBH, Germany).The dipstick strip had a detection limit of 10 mg/dl of protein. According to colour change of the strip, proteinuria was graded (1+,2+,3+,4+). Collected data were stored and screened for any discrepancy. The edited data were analyzed in SPSS 13.

DATA ANALYSIS: For background variables and socio-demographic data descriptive statistics were generated and relative frequency (percentage) was showed. Degree of proteinuria of both groups of patients was analyzed using Chi-square test. Correlation of Blood Pressure and platelet count was sought through Pearson's Correlation Test. Correlation of proteinuria and platelet count was shown through Spearman's Rank Correlation Test.

RESULTS

A total number of 195 pregnant women were included. Among them, 67 were preeclamptic and 128 were eclamptic women. The data were analyzed by descriptive statistics, Chi square and student's t-test, Pearson's Correlation Test and Spearman's Rank Correlation Test. The results of this study show that majority of the patients were< 25 years. Mean age of preeclamptic and eclamptic patients were 27.13±5.19 years and 24.84±4.87 years respectively (Table I). Socio-economic status of most of the subjects of both groups was low. Most of preeclamptic patients were multigravidae and eclamptic patients were primigravidae. Majority of the preeclamptic (62.7%) and eclamptic (53.l%) patients had gestation>32 weeks. Mean systolic blood pressure (SBP) of preeclamptic and eclamptic patients were 164.55±23.37 mm Hg and 163.71±22.34 mm Hg (TableI) respectively. Mean diastolic blood pressure (DBP) of preeclamptic and of eclamptic patients were 106.94±12.52 mm Hg and 110.08±15.85 mm Hg(TableI) respectively. 68.6% of preeclamptic and 84.4% of eclamptic patients had severe proteinuria on dip stick method (Table I). This study shows that 31.3% of preeclamptic and 39.8% of eclamptic patients had platelet count <150,000/cu mm. Mean platelet count of preeclamptic and eclamptic patients were 197,402.99±80,124.54 and 177,750.00±91,376.6 (Table I) respectively. It was observed that there was a negative correlation between SBP (Table II, Figure 1), DBP (Table III, Figure 2) and degree of proteinuria (Table IV, Figure 3) with platelet count in the study subjects. The relation between SBP and platelet count was not statistically significant. But statistically highly significant relation was found in case of other two attributes that is DBP and proteinuria with platelet count.

Table I: Patient's characteristics

Parameter	Results	
	Preeclampsia (67)	Eclampsia (128)
Age (in years)	27.13 ± 5.19	25.63 ± 5.09
Gestational age (in weeks)	31.88 ± 2.01	31.58 ± 2.42
Parity		
Primi	22 (32.8%)	71 (55.5%)
Multi	45 (67.2%)	57 (52.31%)
Socio-economic status		
Middle class	32 (47.8%)	38 (29.7%)
Lower class	35 (52.2%)	90 (70.3%)
Systolic Blood Pressure (mmHg)	164.55 ± 23.37	163.71 ± 22.34
Diastolic Blood Pressure(mmHg)	106.94 ± 12.52	110.08 ± 15.85
Platelet Count	197402.99 ± 80,124.54	177750.00 ± 91,376.61
Thrombocytopenia(<150,000/cu mm)	21 (31.3%)	51 (39.84%)
Proteinuria (≥3+)	46 (68.6%)	108 (84.4%)

Table II: Relation between Systolic Blood Pressure and platelet count

Disease Condition	Mean Systolic Blood Pressure mmHg	Mean Platelet Count/cu mm	r value	*p* value
Preeclampsia	164.55±23.37	197402.99±80,124.54		
Eclampsia	163.71±22.34	177750.00±91,376.61	_0.079	0.271^{ns}

ns = not significant

Table III: Relation between Diastolic blood pressure and platelet count

Disease Condition	Mean Diastolic Blood Pressure mmHg	Mean Platelet Count/cu mm	r value	*p* value
Preeclampsia	10694±12.52	197402.99±80124.54		
Eclampsia	110.08±15.85	177750.00±91376.61	_0.170	0.018*

*Significant. Here Pearson's Correlation Test was done

Table IV: Relation between Proteinuria and Thrombocytopenia

Disease condition	Thrombocytopenia <150,000/cumm	Proteinuria 3+	r value	*p* value
Preeclampsia	110952.38±40,451.79	21(31.34%)	_0.144	0.044*(<0.05)
Eclampsia	79490.20±29,479.74	51(39.84%)		

Here Spearman's Rank Correlation Test was done.

Table V: Comparison of thrombocytopenia between preeclampsia and eclampsia

Disease Condition	Thrombocytopenia<150,000/cumm	*p* value
Preeclampsia (n=21)	110952.38±40,451.79	
Eclampsia (n=51)	79490.20±29,479.74	0.0001***

Data were analyzed using unpaired student's 't' test and presented by mean±SD. Total 72 patients had thrombocytopenia. Out of 72 patients 21 had preeclampsia and 51 had eclampsia. The difference was statistically very highly significant (p= 0.0001).

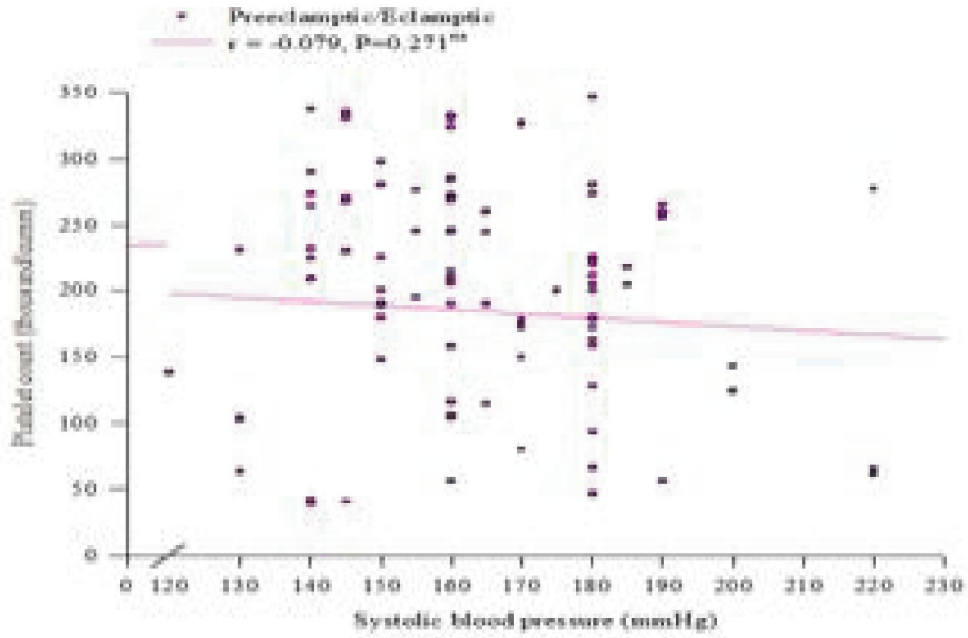

Figure 1: Relation between systolic blood pressure and platelet count

Systolic blood pressure (SBP) of preeclamptic and eclamptic patients was plotted against platelet count. The figure shows negative correlation between SBP and platelet Count. No statistically significant correlation was found between the two attributes ($p>0.05$).

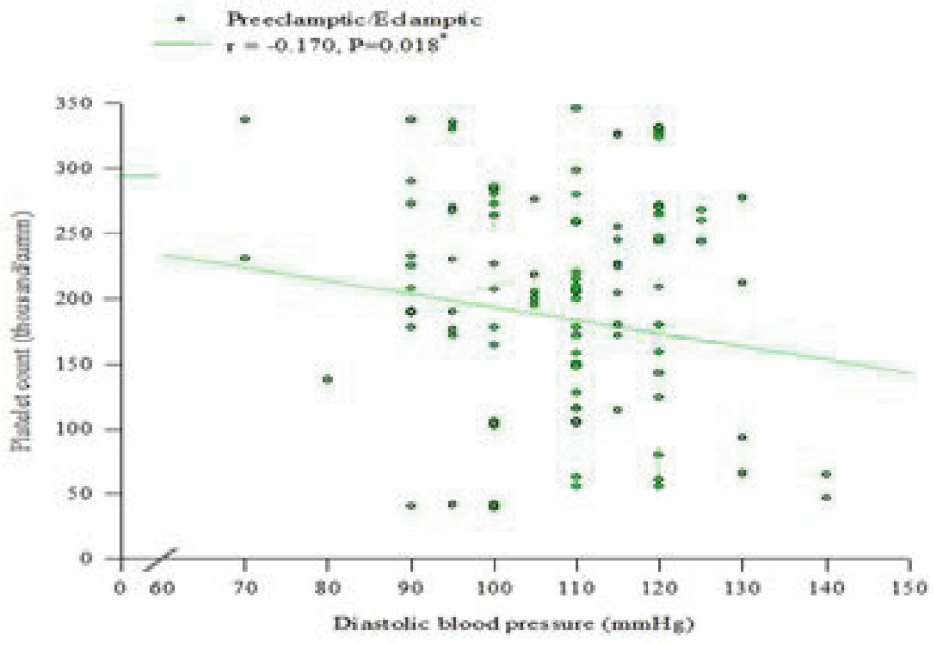

Figure 2: Relation between diastolic blood pressure and platelet count

Diastolic blood pressure of preeclamptic and eclamptic patients was plotted against platelet count. The graph shows moderate negative correlation. Statistically significant correlation was found between the two attributes ($p< 0.05$).

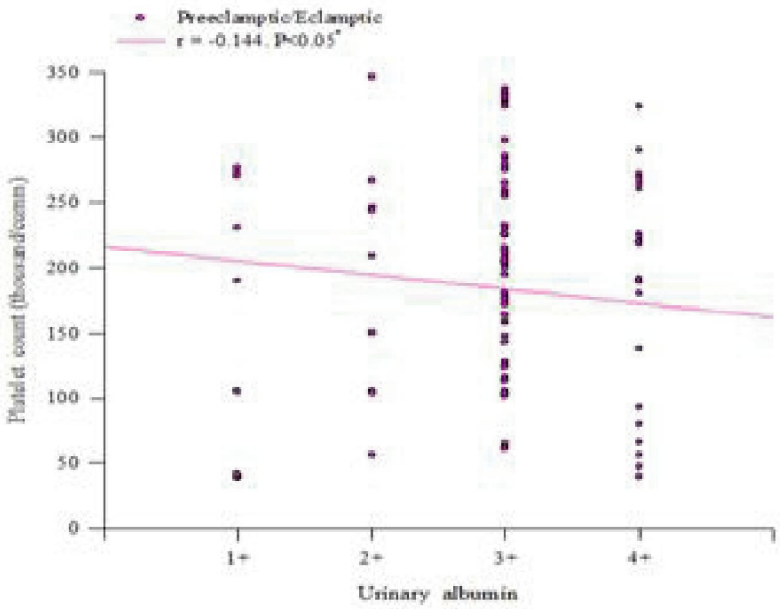

Figure 3: Relation between degree of urine albumin, platelet count of both preeclamptic and eclamptic patients.

The graph shows moderate negative correlation between two attributes which was statistically significant ($p<0.05$).

DISCUSSION

Preeclampsia is a poorly understood condition of human pregnancy, which can affect multiple organs and is a leading cause of maternal death worldwide. The aetiology and patho-physiology remain an enigma, however which hampers progress in prevention, diagnosis and treatment of this condition.[5] Despite decades of intense research, how pregnancy incites or aggravates hypertension remains unsolved.[6] This present cross-sectional analytic study was carried out to determine the proportion of thrombocytopenia among pre-eclamptic and eclamptic patients. This study also aimed at to evaluate association of severity of preeclampsia and eclampsia with degree of thrombocytopenia. Degree of hypertension and proteinuria were considered as the degree of severity of the disease process and eclampsia was taken as a more severe disease than preeclampsia.

In the current study, the mean age was 27.13±5.19 years in preeclampsia, 24.14±4.87 years in eclampsia and mean age of total (n=195) study subject was 25.63±5.09 years. Another study[7] showed higher mean age 27.6±3.8 years. However multiple studies[4,8,9] showed almost similar mean (±SD) age like our study. It was observed in this study that the mean gestational age was 31.88±2.01 weeks and 31.42±2.60 weeks in preeclampsia and eclampsia group respectively. But in another study[4] it was stated that the mean gestational age was 35.1±3.1 weeks in pre-eclampsia and 35.56±2.1 weeks in eclampsia which was higher than our findings. In a different study.[10] it showed that 73.56% of the pre-eclamptic women are >32 weeks of gestational period; the percentage is also higher than present study. Our study showed 52.31% of patients were multipara. Multipara was also found in 76.5% of pre-eclamptic patients[11] like our study elsewhere. Two different studies got majority of eclamptic patient as primi.[9,10] Low socio-economic status is a strong risk factor for preeclampsia. Only a small part of this association

can be explained by the mediating effects of established risk factors for preeclampsia. In this study majority (64.11%) of the patients came from lower socio-economic class. Studies[9,12] showed that most of the eclampsia cases were from below average socio-economic status which matched with ours. In this study most of the cases were presented with severe proteinuria (68.6% of preeclampsia and 84.4% of eclampsia). Majority of the patients that is 74.96% had proteinuria >3+. There was statistically significant (p<0.05) difference in between preeclampsia and eclampsia group in terms of proteinuria but 30.5% of eclampsia patients in contrast with 14.9% of preeclampsia patients had 4+ proteinuria. Severe grade of proteinuria was evident in more severe disease. The severity of the proteinuria in pre-eclampsia has been regarded as a predictor of adverse outcomes for the mother.[13] Others have been less sanguine about the relationship.[14] A reliable correlation between the level of proteinuria and severity of pre-eclamptic complications would be extremely valuable for clinical decision making. In a study it was observed that proteinuria in pre-eclampsia is associated with more severe fetal involvement and growth retardation.[15]

In our study, thrombocytopenia was present in 21(31.3%) of pre-eclamptic patients and 51 (39.8%) of eclamptic patients. The mean ±SD platelet count was 197,402.99±80,124.54 in pre-eclamptic patients and 177,750.00±91,376.61 in eclamptic patients. The mean for the both groups was found to be 184,502.56/cu mm. A different study[4] shows a lower count than this, 1.82 lacs/mm3 ± 0.45 in preeclampsia and 1.21 lacs/mm3 ± 0.49 in eclampsia. A study shows platelet count 155,500±31,290 in preeclampsia and 131,000±33,279 in eclampsia (p<0.0001) which is also lower than the current study.[8] Another study[12] found 47.00% of patients with PE and eclampsia having low platelet count (<150,000/mm3). Among the eclamptic group 60.00% had low platelet count (<150,000). The result also mtches with our study in terms of association of low platelet count and eclampsia but the percentage is higher than ours.Mean platelet count in our study was higher than others.[4,8,16,17] Current study shows very highly significant difference in extent of thrombocyto-penia (0.0001) between preeclampsia and eda-mpsia. This finding is similar with two more studies.[4,17] Other studies observed no remarkable difference.[16,18] in degree of throm-bocytopenia.

CONCLUSION

Current study shows that thrombocytopenia was prominent in preeclampsia and eclampsia group. The relation between systolic blood pressure and platelet count was not significant. But there was a significant relation between diastolic blood pressure and proteinuria with platelet count. Thrombocytopenia was more pronounced in the eclampsia group than the preeclampsia group which was statistically highly significant (p=0.0001). So, it may be concluded that throm-bocytopenia is significantly related with the severity of the disease.

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Conflicts of Interests: None.

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